REMARKS

The Applicant has filed the present Amendment in reply to the Final Rejection of November 18, 2002 and the Advisory Action of March 18, 2003, and concurrently with a Request for Continued Examination (RCE). The Applicant respectfully submits that this Amendment is fully responsive to the Final Rejection and Advisory Action for reasons set forth below.

In the Final Rejection, the Examiner maintained rejections of Claims 1-21 pursuant to 35 U.S.C. § 102(b), as allegedly anticipated by Katata, *et al.* (U.S. patent application no. 5,631,644) (hereinafter "Katata"). In the Advisory Action, the Examiner clarified the Examiner's position of record on the basis of Katata, alleging that Katata controls quantization step size based on bit allocation, or more precisely, remaining bits left in the buffer R (See Katata Col. 3, line 10-35) are based on the GOP bit budget (See Katata Col. 4, lines 60-65). That is, the Examiner alleged that the GOP average bit rate is accounted for in the allocation of number of bits for each GOP and the quantization step size for each picture type and is substantially the same for each GOP as it begins. (See. Advisory Action, pp. 2).

At the outset and before addressing particular issues raised in the Final Rejection and the Advisory Action, the Applicant has cancelled independent Claim 21 without prejudice or disclaimer, and has amended independent Claims 1 and 11 to more clearly recite an inventive aspect of the present invention. More specifically, the Applicant has amended the apparatus Claim 1, by reciting a quantization step size setting means for calculating average complexity of whole coded data from the quantization step size provided to the video coding means and also the generated code bit count provided

from the video coding means and for setting a reference quantization step size for each first image unit corresponding to the target average bit rate from the average complexity; and a quantization step size adjusting means for calculating a bit balance of the generated bit count with respect to the target average bit rate with a virtual buffer that is independent of picture types and for adjusting the reference quantization step size provided from the quantization step size setting means for each second image unit from the bit balance. The Applicant has further amended the method Claim 11 commensurately with amendments to Claim 1. Support for the amendments is found in the present specification on page 21, line 18 – page 27, line 20 with reference to Figures 2 – 4. The Applicant respectfully submits that not new subject matter has been added by the foregoing amendments.

In addition, the Applicant has amended dependent Claims 7 and 17 to correctly recite that it is the quantization step size adjusting means that adjusts the quantization step size for each second image unit. The Applicant has further amended Claims 9 and 19 to clarify that the quantization step size of the first image unit is determined from the average first image unit complexity for the first image unit over the preceding coded image, the first image unit complexity of the immediately preceding first image unit or an average of a plurality of the first image unit complexity including the immediately preceding first image unit and the bit rate per first image unit. The Applicant respectfully submits that no new subject matter has been added by the foregoing amendments.

In traversing the rejection of independent Claims 1 and 11 (independent Claim 21 cancelled) pursuant to 35 U.S.C. §102(b), the Applicant first respectfully

submits that the primary reference to Katata does not disclose a quantization step size setting means (and step) for calculating average complexity of whole coded data from the quantization step size provided to the video coding means and also the generated code bit count provided from the video coding means and for setting a reference quantization step size for each first image unit corresponding to the target average bit rate from the average complexity. In general, although Katata and the present invention are similar insofar as they both control the generated code quantity, Katata concerns fixed bit rate control as the subject and has an object of evading the overflow and the underflow of the coding buffer (See Katata Col. 5, lines 40-42), whereas the present invention has an object of performing code quantity control with variable bit rate control as the subject. Thus, there is clear distinction in the objectives between Katata and the present invention. Whereas the presently claimed invention performs the quantization step size control (*via adjusting means*) based on a balance of a virtual buffer used in the average bit rate control, Katata performs the desired code quantity control based on the difference from desired code quantity by using buffer fullness. Thus, Katata's method is one for matching the desired code quantity and is not one for directly controlling the average bit rate.

Regarding the setting of the reference quantization step size in Claim 1 and 11, Katata discloses calculating the degree of complexity of *each picture type* to determine the desired code quantity individually for each picture type and determining the quantization step size based on the determined code quantity (See Katata Col. 2, line 50 to Col. 3, line 39). That is, Katata controls the generated code quantity to be substantially the same for each GOP because the remaining code quantity in the GOP that is capable of being utilized is distributed for *each picture type*. However, the quantization step size

varies with the difficulty of the input image, thus adversely affecting the coded image quantity.

To the contrary of Katata, present invention calculates the average image complexity over the entire preceding sequence from the generated code quantity and the quantization step size of all the video data (motion picture images) coded so far (*whole coded data*), and the reference quantization step size is calculated from the results of calculation (*average complexity*) and the desired average bit data (*target average bit rate*) (See present specification on page 26, lines 15-28). Since the reference quantization step size is determined with respect to the average image complexity of all images, the calculated quantization step size is subject to less time variations and is thus made stable. Thus, the code quantity allotted based on the complexity of input images is varied, and the variable bit rate control is thus realized. This represents a significant difference and a great advantage over Katata.

Consequently, the Applicant respectfully submits that the primary prior art reference to Katata fails to disclose quantization step size setting means (and step) for calculating average complexity of whole coded data from the quantization step size provided to the video coding means and also the generated code bit count provided from the video coding means and for setting a reference quantization step size for each first image unit corresponding to the target average bit rate from the average complexity.

In further traversing the rejection of independent Claims 1 and 11 (independent Claim 21 cancelled) pursuant to 35 U.S.C. §102(b), the Applicant further respectfully submits that the primary reference to Katata does not disclose a quantization step size adjusting means for calculating a bit balance of the generated bit count with

respect to the target average bit rate with a virtual buffer that is independent of picture types and for adjusting the reference quantization step size provided from the quantization step size setting means for each second image unit from the bit balance.

Regarding the adjusting of the reference quantization step size in Claims 1 and 11, Katata discloses calculating the buffer fullness of each picture type and performing quantization step size control based on the difference between the desired code quantity and the actual generated code quantity of each picture type (See Katata Col. 3, lines 46-58). The buffer fullness is set for each picture type, and also the desired code quantity is set for each picture type. For this reason the desired code quantity is not fixed, and thus, Katata's quantization step size control itself that uses buffer fullness fails to directly correspond to the average bit rate control. More specifically, the desired code quantity is set under the average bit rate, and the quantization step size control using buffer fullness matches the generated code quantity to the desired code quantity. This means that the quantization step size control, although indirectly involving average bit rate control, is different from the present invention, in which average bit rate control uses the balance of the generated code quantity after the reference quantization step size setting.

In addition and to the contrary of Katata, according to the present invention, a virtual buffer which is not based on picture type, is provided for measuring the balance of the generated code quantity with respect to the average rate and thus adjusting the reference quantization step based on the balance (See present specification on page 26, line 1; page 29, lines 8-24). The step size of the virtual buffer directly shows the balance of the generated code quantity with respect to the desired averaged bit rate,

that is, the positive and negative values showing the balance of the generated code quantity, respectively. However, in Katata the quantization step size is set to be proportional to the buffer fullness, and the negative value buffer fullness cannot be used.

Consequently, the Applicant respectfully submits that the primary prior art reference to Katata fails to disclose a quantization step size adjusting means for calculating a bit balance of the generated bit count with respect to the target average bit rate with a virtual buffer that is independent of picture types and for adjusting the reference quantization step size provided from the quantization step size setting means for each second image unit from the bit balance.

In view of the foregoing, the Applicant respectfully requests the Examiner to withdraw the rejection of independent Claim 1 and 11 pursuant to 35 U.S.C. §102(b). Furthermore, Applicant respectfully requests the Examiner to withdraw the rejections of dependent Claims 2-10 and 2-20 pursuant to 35 U.S.C. §102(b), based on their respective dependencies from independent Claims 1 and 11, respectively.

In view of the foregoing, the Applicant believes that the above-identified application is in condition for allowance and henceforth respectfully solicits the allowance of the application. If the Examiner believes a telephone conference might expedite the allowance of this application, the Applicant respectfully requests that the Examiner call the undersigned, Applicant's attorney, at the following telephone number: (516) 742-4343.

Respectfully submitted,

Paul J. Esatto, Jr.
Registration No. 30,749

SCULLY, SCOTT, MURPHY & PRESSER
400 Garden City Plaza
Garden City, New York 11530
(516) 742-4343

AGV:eg

G:\Nec\1067\13273\amend\13273.am4.doc